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From: Cantello, Nicole
Sent: Tuesday, October 03, 2017 4:48 PM
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Subject: S.H. Bell Company / EPA NOV No. EPA-5-17-IL-10
Attachments: LETTER TO NICOLE CANTELLO RESPONSE TO 8-7-17 NOV (J2273067x7AD79).pdf;
ATTACHMENTS TO N CANTELLO LETTER OCTOBER 2 2017 (J2272976x7AD79).pdf

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October 2, 2017

Via E-mail

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Re: S.H. Bell Company
EPA NOV No. EPA-5-17-IL-10

Dear Ms. Cantello:

On behalf of the S.H. Bell Company ("S.H. Bell"), I write in response to the August 7, 2017 U.S. EPA Notice of Violation ("NOV") sent to S.H. Bell, our Section 113 conference call regarding the same on September 14, 2017, and your e-mail request for additional information on September 18, 2017. This response is divided into two parts with Section I containing the requested information and Section II containing objections to the NOV.

I. Requested Information

In response to your September 18, 2017 e-mail, S.H. Bell is providing the requested barge information and a preliminary risk assessment at Attachment A and Attachment B, respectively. Attachment A, which consists of the barge information, is confidential business information ("CBI") and therefore, is not subject to public disclosure under 5 U.S.C. § 552(b)(4) and 40 C.F.R. §§ 2.105(a)(4). S.H. Bell is only providing the content of Attachment A, which has been marked as CBI, with its hard-copy mailing. The electronic transmission of this letter will have a CBI placeholder for Attachment A as is customary practice.¹

¹ In the September 18, 2017 e-mail, U.S. EPA also requested barge information to be provided on a going forward basis with the FEM PM₁₀ monitor data. S.H. Bell is willing to accommodate this request provided that additional barge information is likewise treated as CBI and, therefore, exempt from public disclosure. S.H. Bell will be sure to mark the barge information as CBI and will provide it to EPA on a

Additionally, as discussed during the September 14 conference call, the following measures are now in place at the Chicago facility:

- The Norcon truck load-out dust collector became fully operational on August 16th and the Ryerson truck load-out dust collector became fully operational on August 29th.
- Cessation of loading/unloading of barges with Affected Materials² during high wind events (when wind speeds exceed 15 miles per hour over two consecutive five minute intervals).
- All super sacks of Affected Materials are transported from the barge directly to storage inside a building. Super sacks of Affected Materials are not opened outdoors at the dock.
- Affected Materials are not stored outdoors.
- Addition of a door on the west-end of the Norcon building.

In terms of conducting a data driven evaluation, S.H. Bell is the only company in Chicago that has been required to install continuous and filter-based PM₁₀ monitors and likewise is the only company that is required to monitor for metals in Chicago. The monitoring data through August was collected before the Ryerson and Norcon truck load baghouses became fully operational and before these additional measures had been fully implemented. S.H. Bell believes that these baghouses along with the additional measures will have a positive impact on the monitor data. We appreciate U.S. EPA's recognition during the September 14 conference call that it is fair to allow time for the monitoring data to reflect the implementation of these new practices.

II. Objections to the NOV

S.H. Bell objects to the issuance of the NOV for multiple reasons, including: (1) the six month manganese average that includes the August data is *less* than U.S. EPA's health based screening level; (2) U.S. EPA ignored that the health based screening level must be compared to at least a year's (365 days) worth of data and is using this screening level for a non-sanctioned purpose; (3) a preliminary risk assessment according to U.S. EPA's risk assessment procedures shows that there is no risk to human health at the four month manganese average cited in the NOV as well as no risk at the five and six month manganese averages; (4) U.S. EPA cannot provide a clear compliance target; (5) it is questionable as to whether U.S. EPA

CD with its hard-copy submission. S.H. Bell will not include it with its courtesy electronic submission of the data in order to prevent accidental electronic transmission.

² For consistency, S.H. Bell uses the same definition for manganese-containing materials, "Affected Materials" as used at S.H. Bell's East Liverpool, Ohio facility.

should proceed with the NOV before known additional control measures are operational; and (6) U.S. EPA should have considered the impact of the offsite sources on the measured ambient manganese levels especially in light of the absence of a health risk.³ Each of these objections is discussed more fully below.

A. Current Manganese Data and Application of the Health Based Screening Standard

The monthly manganese average for August is $0.197 \mu\text{g}/\text{m}^3$. With the August manganese data, the six month manganese average is $0.29 \mu\text{g}/\text{m}^3$, which is less than the manganese minimal risk level ("MRL") of $0.3 \mu\text{g}/\text{m}^3$. However, in order to properly evaluate potential public health risk, the established U.S. EPA and ATSDR protocols direct that the manganese MRL is compared to at least one year's worth (365 days) of data. Nonetheless, even in the absence of 365 days' worth of data, as discussed more in Section B of this letter, a preliminary risk assessment according to U.S. EPA's risk assessment procedures demonstrates that there is no public health threat.

Even with the preliminary risk assessment, S.H. Bell objects to U.S. EPA's use of the health based risk screening standard as a basis for the NOV because, in doing so, U.S. EPA has misapplied the science and is using it for a non-sanctioned purpose. The health based risk screening standard is only to be used to determine whether further evaluation is needed and it may not be used as a limit or action level according to ATSDR. Moreover, ATSDR has clearly stated that exposure to levels above the health based risk screening standard do not mean health effects will occur.

As stated in the NOV Findings of Fact, Paragraph 8, and as noted in Table 1 of the EPA Dose-Response Assessment for Assessing Health Risks Associated with Exposure to Hazardous Air Pollutants webpage⁴, U.S. EPA has adopted its chronic health based risk screening level for manganese of $0.3 \mu\text{g}/\text{m}^3$ from ATSDR's minimum risk level ("MRL") for manganese. In fact, U.S. EPA has gone a step further and recognized in rulemaking that its previous screening level for manganese, the 1993 IRIS RfC, was outdated and that U.S. EPA policy dictates that the agency use ATSDR's MRL for manganese as it is based on updated dose response modeling

³ S.H. Bell also has concerns about U.S. EPA's ability to enforce the Illinois SIP provision cited in the NOV, which were outlined in S.H. Bell's opposition to the United States' motion for summary judgment in *United States v. S.H. Bell Company*, No. 16-7955 (N.D. Illinois) and are hereby incorporated by reference as if set forth fully herein. S.H. Bell also reserves any and all legal arguments it may have if the NOV.

⁴ See EPA Dose-Response Assessment for Assessing Health Risks Associated with Exposure to Hazardous Air Pollutants, Tables 1 and 2, available at <https://www.epa.gov/fera/dose-response-assessment-assessing-health-risks-associated-exposure-hazardous-air-pollutants>. Risk-based screening thresholds are referenced as a matter of convenience.

methodology and considered recent pharmacokinetic findings. *See* 79 Fed. Reg. 60238, 60247 (Oct. 6, 2014); 80 Fed. Reg. 37366, 37375 (June 30, 2015).

A visual representation of how the manganese MRL is used to assess potential health risk can be summarized in the following two equations:

- Chronic (year+ avg.) PM_{10} manganese $\leq 0.3 \mu\text{g}/\text{m}^3 \rightarrow$ no health risk
- Chronic (year+ avg.) PM_{10} manganese $> 0.3 \mu\text{g}/\text{m}^3 \rightarrow$ further evaluation needed

ATSDR's manganese MRL of $0.3 \mu\text{g}/\text{m}^3$ is used to assess whether there is a potential (not automatic) health risk from inhaled manganese by comparing "**chronic**" inhalation exposure to "**respirable**" manganese concentrations in the air. *See ATSDR Toxicological Profile for Manganese*, at p. 22.⁵

"**Respirable**" manganese refers to the very small size of particles that can be inhaled into the deep lungs and is conservatively represented by particulate matter that is 10 microns or less (PM_{10}). *See ATSDR Toxicological Profile for Manganese*, at p. 22. "**Chronic**" under the manganese MRL means only exposure to long-term averages of PM_{10} manganese concentrations of at least a year or more (365 days or more) can be compared to the manganese MRL. *Id.* U.S. EPA has also specifically recognized that, at a minimum, the manganese MRL is based on exposure over a year or more as it specifically stated in an official peer-reviewed publication that the manganese MRL was developed as "an estimate of a chronic inhalation exposure that is likely to be without appreciable risk of adverse non-cancer effects during a lifetime." *See* U.S. EPA Report on the Environment, Manganese Concentrations in Region 5 (2015), at p. 2.⁶ Thus, according to both U.S. EPA and ATSDR, the manganese MRL must be compared to at least a yearly average of PM_{10} manganese concentrations. Accordingly, comparison of daily, monthly, or quarterly averages of PM_{10} manganese concentrations to the manganese MRL is premature and is not scientifically supportable. Accordingly, in issuing the NOV based only on a four month manganese average instead of an average based on at least a year (365 days or more) of data and in insinuating that there is a public health hazard when there is not, U.S. EPA has clearly misapplied the science and purpose underlying the manganese MRL.

⁵ Available at <https://www.atsdr.cdc.gov/toxprofiles/tp151.pdf>.

⁶ Available at https://cfpub.epa.gov/roef/indicator_pdf.cfm?i=6. U.S. EPA's 2015 Report on the Environment was prepared by the National Center for Environmental Assessment within U.S. EPA's Office of Research and Development, working in collaboration with U.S. EPA's Program and Regional offices. The Report on the Environment was additionally peer-reviewed by U.S. EPA's Science Advisory Board in July 2014 prior to publication of the final report. *See* 80 Fed. Reg. 44104 (July 24, 2015).

A comment made by U.S. EPA during the September 14 conference call suggesting that certain populations are at risk at an inhalation exposure less than the manganese MRL is not scientifically accurate and likewise is further evidence that U.S. EPA is misapplying the science behind the MRL in issuing the NOV. ATSDR specifically derives MRLs in a manner such that the MRL is set below the level of chronic exposure that might cause adverse health effects in the people most sensitive to such chemical-induced effects. *See ATSDR Toxicological Profile for Manganese*, at p. A-1. Additionally, ATSDR has also clearly stated that “[e]xposure to a level above the MRL does not mean that adverse health effects will occur.” *Id.* In deriving MRLs, ATSDR also uses “a conservative (i.e., protective) approach to address uncertainty” due to the “lack of precise toxicological information on the people who might be most sensitive (e.g., infants, elderly, nutritionally or immunologically compromised)” in order to be “consistent with the public health principle of prevention.” *Id.* at p. A-2. Notably for the manganese MRL, ATSDR specifically built in an uncertainty factor “for human variability including possibly enhanced susceptibility of the elderly, infants, and children; individuals with chronic liver disease or parenteral nutrition; and females and individuals with iron deficiency.” *Id.* at Appendix A. The manganese MRL and the uncertainty factor that ATSDR used in the derivation of the same are based upon two published and peer reviewed physiologically-based pharmacokinetic models (“PBPK models”) for manganese that were developed at U.S. EPA’s request, namely Schroeter et al. 2011⁷ and Yoon, et al. 2011.⁸ *See id.*

U.S. EPA is also using the manganese MRL for a non-sanctioned purpose in listing an exceedance of the manganese MRL as one of the alleged violations in the NOV. U.S. EPA’s press release on the NOV makes it even clearer that this is an intended separate violation. As U.S. EPA is well aware, however, the manganese MRL is not an emission limitation that has been developed under the Clean Air Act nor is it an applicable requirement or limit in the facility’s air permits. Moreover, ATSDR has clearly stated that “**MRLs are not intended to define clean-up or action levels,**” but instead “are intended only to serve as a screening tool to help public health professionals decide where to look more closely.” *See ATSDR Toxicological Profile for Manganese*, at p. A-1. Thus, the manganese MRL itself cannot be used in a manner that suggests that it is an actionable standard or an emissions limitation. To do otherwise is clearly a non-sanctioned use of the MRL and only serves as improper insinuation where there has been no demonstrated public health threat.

⁷ Schroeter, JD; Nong, A; Yoon, M; Taylor, MD; Dorman, DC; Andersen, ME; Clewell, HJ III. 2011, “Analysis of manganese tracer kinetics and target tissue dosimetry in monkeys and humans with multiroute physiologically based pharmacokinetic models,” *Toxicol. Sci.* 120(2):481-498. Doi:10.1093/toxsci/kfq389 (Schroeter et al. 2011).

⁸ Yoon, M; Schroeter, JD; Nong, A; Taylor, MD; Dorman, DC; Andersen, ME; Clewell, HJ III. 2011, “Physiologically Based Pharmacokinetic Modeling of Fetal and Neonatal Manganese Exposure in Humans: Describing Manganese Homeostasis during Development,” *Toxicol. Sci.* 122(2):297-316. Doi:10.1093/toxsci/kfr141 (Yoon et al. 2011).

B. Preliminary Risk Assessment

S.H. Bell engaged experts in manganese toxicology and in human health risk assessment (including a former Chief of Air Toxics Staff for U.S. EPA Region I) from Gradient to conduct a preliminary risk assessment of the potential risk to human health from the measured manganese levels. A copy of the preliminary risk assessment is provided at Attachment B. As was expressed during the September 14 conference call, we appreciate U.S. EPA's willingness to consider this preliminary risk assessment as part of our response to the NOV.

The preliminary risk assessment was conducted pursuant to U.S. EPA's well established guidance for conducting risk assessments. In this case, the risk assessment is preliminary because a full year's worth of data from the fence line ambient monitors at the facility, which is needed to appropriately assess the conservative chronic inhalation exposure to manganese,⁹ is not yet available. Nonetheless, Gradient conducted the preliminary risk assessment using averages of the manganese data for three time periods: from March through June 2017, March through July 2017, and March through August 2017. Gradient concludes that there is no risk to human health from the inhalation of manganese in the vicinity at the S.H. Bell facility for each of the three time periods and thus, there is no evidence that manganese in the ambient air near the S.H. Bell facility causes adverse health effects in the nearby community.

As an aside, S.H. Bell is unclear as to what U.S. EPA meant by an "alternate hazard index" for the risk assessment in the September 18, 2017 e-mail. The preliminary risk assessment prepared by Gradient does not rely on any alternative or alternate hazard index. Gradient's conclusions are based on the standard Hazard Index used in U.S. EPA risk assessment procedures where a Hazard Index value of one or less indicates that no adverse human health effects (non-cancer) are expected to occur. It is important to recognize that it is unquestionably routine and well-established practice for experienced risk assessors, both inside and outside of U.S. EPA, to round the calculated hazard index to the nearest one significant figure.¹⁰

⁹ However, note that U.S. EPA has specifically recognized that "[a] monitor placed at the fence line of an emissions source would not be considered to represent community exposures, even though there might be residences abutting that fence line." Guidance for Network Design and Optimum Site Exposure for PM_{2.5} and PM₁₀, U.S. EPA Office of Air Quality and Planning Standards, December 1997, at p. 2-13, available at <https://www3.epa.gov/ttn/amtic/files/ambient/pm25/network/r-99-022.pdf>. Thus, any metals concentrations detected in the FRM PM₁₀ monitors are not reflective of actual exposure to the community for these metals as the monitors are located on S.H. Bell property.

¹⁰ In fact, U.S. EPA's risk assessment guidance has recognized that hazard indices should be reported as one significant figure since 1989. See Risk Assessment Guidance for Superfund (RAGS). Volume I: Human Health Evaluation Manual (Part A) (Interim final), U.S. EPA Office of Emergency and Remedial Response (December 1989), at Exhibit 8-3 ("All hazard indices and hazard quotients should be expressed as one significant figure."), available at https://www.epa.gov/sites/production/files/2015-09/documents/rags_a.pdf. U.S. EPA has also recognized that hazard indices are rounded to the nearest one significant figure in human health risk assessments specifically related to air emissions. See U.S. EPA Human Health Risk Assessment Protocol Hazardous Waste Combustion Facilities, U.S. EPA

This preliminary risk assessment from Gradient, which concludes there is no risk from manganese inhalation is also consistent with the ultimate conclusion in ATSDR's August 22, 2016 Health Consultation: Review of Analysis of Particulate Matter and Metal Exposure in the Air KCBX (AKA, "Chicago Petroleum Coke" Sites). As such, S.H. Bell strongly objects to U.S. EPA's gross and irresponsible mischaracterization of the ultimate conclusion in the ATSDR report in Paragraph 9 of the NOV. Although not the model of clarity or organization in many respects, the August 22, 2016 ATSDR report clearly ultimately concludes that there is not an elevated non-cancer risk to the community from any metal, including manganese, nor combination of metals based on the calculated hazard indices after target organ segregation, which ATSDR did, and correctly stated was warranted, pursuant to U.S. EPA's own risk assessment procedures.¹¹

C. Lack of a Clear Compliance Target

We were concerned to hear during the September 14 conference call that U.S. EPA could not provide S.H. Bell with a clear compliance standard with respect to the ambient manganese levels being measured at the PM₁₀ FRM monitors installed at northeast corner of S.H. Bell's Chicago facility, especially since the ambient manganese levels are the basis for the NOV even though there has been no demonstration of a public health threat. In the NOV Findings of Fact Paragraphs 8 and 15, U.S. EPA states that the health based screening level for manganese is ATSDR's MRL of 0.3 µg/m³ and that the four month average of manganese PM₁₀ data collected from the fence line monitors at the Chicago facility was 0.32 µg/m³. S.H. Bell does not dispute either of these Findings of Fact, but does dispute the alleged "Violation" in Paragraph 16 (in addition to Paragraph 17) that "EPA has found manganese levels that exceed the health-based standard screening level" because as discussed above, the manganese MRL is clearly and unequivocally only comparable to at least one full year (365 days or more) of data. Not only is it a non-sanctioned use of the MRL as discussed above in Section A of this letter, but it also clearly begs the question as to what is the facility's compliance target.

Office of Solid Waste and Emergency Response, September 2005, at p. 7-2 – 7-3 ("Standard rules for rounding apply which will commonly lead to an answer of one significant figure in both risk and hazard estimates. For presentation purposes, hazard quotients (and hazard indices) and cancer risk estimates are usually reported as one significant figure. We recommend rounding only the final reported results, not the intermediate calculations."), available at https://rais.ornl.gov/documents/2005_HHRAP.pdf

¹¹ See ATSDR's August 22, 2016 Health Consultation: Review of Analysis of Particulate Matter and Metal Exposure in the Air KCBX (AKA, "Chicago Petroleum Coke" Sites), at p. 21-22 ("If this risk exceeds a hazard index (HI) of 1, then a more detailed assessment of "target organ" risk calculations is warranted (U.S. EPA, 1989) . . . If we were to move on to a target organ risk assessment for these metals, manganese would not contribute to respiratory non-cancer risks like many of the other pollutants such as nickel and zinc, because it is a neurotoxin and affects brain function. Thus, the overall HI for respiratory effects would be less than 1 for the mean and 95% UCL for respiratory non-cancer effects as well as for neurological effects at both sampling sites.") (emphasis added).

In response to Scott Dismukes' question during the September 14 conference call raising this issue and asking whether an exceedance of the MRL on a daily, monthly, or some other timeframe basis would constitute a violation according to U.S. EPA, U.S. EPA noted that there is no bright line or clear standard and suggested it based its decision to issue the NOV on its perception of a health risk and in order to err on the side of being protective while noting that the agency did not think it needed a years' worth of manganese data to find a health risk or a violation. In addition to the potential due process concerns raised because S.H. Bell does not have fair notice of what constitutes required or prohibited conduct, U.S. EPA had no scientific basis for its perception of health risk according to U.S. EPA's and ATSDR's own best available science and U.S. EPA's own risk assessment procedures as discussed more fully above in Sections A and B of this letter. S.H. Bell is committed to ensuring a safe environment for the community and its employees. However, the company cannot be held to an unclear subjective and arbitrary standard where there is no demonstrated public health threat.

D. The NOV was Issued Before Known Additional Control Measures were Operational

We have a substantial question as to whether EPA should be proceeding with the NOV not only because it is not scientifically justified and there is no demonstrated public health threat, but also because it was issued before known additional control measures were installed and operational. Specifically, the monitoring data does not yet reflect the installation and operation of the baghouses on the Norcon and Ryerson truck load-outs. The Norcon truck load-out dust collector became fully operational on August 16th and the Ryerson truck load-out dust collector became fully operational on August 29th.

U.S. EPA has been well aware of the planned installation of these truck load-out baghouses for some time. Notably, S.H. Bell committed to installing these baghouses in a letter to U.S. EPA dated October 27, 2014. Even though S.H. Bell almost immediately started the process to install the baghouses after its October 27, 2014 letter, there were many long delays outside of S.H. Bell's control. For example, on November 4, 2014, S.H. Bell sought approval from Com-Ed for new and upgraded electric services to accommodate the baghouses. It took Com-Ed almost a year (until September 2015) for it to complete the final connection for the new services needed for the baghouses. It additionally took City of Chicago eight months to grant building permits for the baghouses. At a minimum, U.S. EPA should not have issued the NOV alleging a violation of the Illinois SIP provision as referenced in Paragraph 17 of the NOV until after the monitoring data could reflect the operation of these additional control measures, which were known to U.S. EPA.

E. Offsite Source Impacts

As U.S. EPA is aware, the FRM PM₁₀ ambient air monitors at the Chicago facility are designed to measure concentrations generally in the air and not from any one particular source or facility because these monitors draw in and measure the particulate in the air from all directions. As U.S. EPA has noted, PM_{2.5} and PM₁₀, both of which are measured by the FRM PM₁₀ ambient air monitors at the facility, can travel in distances up to thousands of kilometers and tens of

kilometers, respectively. See U.S. EPA Integrated Science Assessment for Particulate Matter, December 2009, Table 3-1, at p. 3-4.¹²

An evaluation of the data suggests that offsite factors actually cause or contribute to the relatively higher daily levels of manganese measured by the FRM PM₁₀ monitors. S.H. Bell analyzed the days where manganese levels of greater than 0.3 µg/m³ were measured by the FRM PM₁₀ monitors. This evaluation shows that on the majority, if not all, of these days, offsite manganese sources were clearly contributing to the higher manganese levels measured on these days. While S.H. Bell has implemented measures that it expects to reduce its manganese emissions as discussed above, S.H. Bell has no control over offsite manganese sources. Accordingly, consideration and evaluation of these offsite factors is critical as part of a data driven evaluation. In other words, it would be completely irrational and illogical for U.S. EPA to continue to selectively target S.H. Bell in spite of data showing that offsite sources are contributing to the higher measured manganese levels and that S.H. Bell's additional measures are having a positive impact on the data.

In this regard, a preliminary statistical analysis of the metals concentration data from the monitors shows a moderate correlation between the measured manganese concentrations at the monitor and both cadmium ($r^2 = 0.30$) and lead ($r^2 = 0.29$) concentrations.¹³ This result suggests that approximately one-third of the measured variation in manganese concentrations aligns with the variations in cadmium and lead concentrations. And in both cases, the P-values are well below 0.01, affirming that the correlation between observed manganese levels and both cadmium and lead levels is statistically significant. As S.H. Bell does not handle any bulk materials at the Chicago facility that contain cadmium or lead, the data and the correlations suggest that manganese originates from multiple sources including offsite sources emitting cadmium and lead. While there may be other sources, U.S. EPA has identified likely sources of lead, cadmium, and manganese emissions in the prevailing upwind south/southwest direction of the S.H. Bell facility. See U.S. EPA Xact Metals Study: Southeast Chicago, September 10, 2015.¹⁴

Evaluation of March Data

In evaluating the manganese data and the meteorological data from March 2017, S.H. Bell noticed that there were three days where the manganese concentrations were very likely

¹² Available at <https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=216546>.

¹³ The preliminary statistical analysis is for the metals data collected from the filter-based PM₁₀ monitors from April 1, 2017 through July 30, 2017. The March data was not used because the laboratory method detection limit was not available and the August data was not available at the time that the calculations were made.

¹⁴ Available at https://www.cityofchicago.org/content/dam/city/depts/cdph/environmental_health_and_food/A1NRDCS_upComKinderMorganVarReq_3102017.pdf.

impacted by manganese emissions from off-site sources, namely, March 2, 8, and 20. For example, on March 2, the winds were consistently from the Northwest direction suggesting an off-site source of manganese, especially since S.H. Bell's production records confirmed that no operations with materials containing manganese occurred at the Northwest portion of the facility. *See* March 2, 2017 wind rose (Attachment C).

On March 8, the winds were coming from the typical Southwest/West direction across the facility. *See* March 8, 2017 wind rose (Attachment D). However, high PM₁₀ hourly readings from that day correlated with visible dust observed originating from the Skyway Cement facility that is directly across the river from the S.H. Bell facility. *See* March 8 Photos of Skyway Cement Facility (Attachment E). Skyway Cement processes steel slag to make its cement and it is well known that steel slag contains manganese. Accordingly, since the manganese levels on March 8 are much higher than the other days in March where winds were coming from the typical Southwest/West direction, it is very likely that Skyway Cement's manganese emissions were picked up by S.H. Bell's monitor. Finally, on March 20, the winds were consistently coming from the North suggesting an off-site source of manganese. *See* March 20, 2017 wind rose (Attachment F). S.H. Bell notes that North American Stevedoring Company is less than a mile north of its facility and that its bulk materials variance application with City of Chicago specifies that it handles ferromanganese (which is one of the same materials that S.H. Bell handles).

The data also suggests that there is a background concentration of manganese in the area because the data set includes three weekend days (March 5, 11, and 26) that had detectable levels of PM₁₀ manganese-days when neither S.H. Bell nor many other companies operate. It is well known that urban areas have ambient manganese background concentrations, some of which could come from the use of manganese as an additive in gasoline. *See e.g., ATSDR Toxicological Profile for Manganese, at* p. 40-41, 391-392, 398-400.

Evaluation of April Data

In evaluating the manganese data and the meteorological data from April 2017, S.H. Bell noticed that there were days where the manganese readings were potentially impacted by emissions from off-site sources, namely, April 10th and April 13th.

On April 10, the winds were consistently from the south/southwest. *See* April 10, 2017 wind rose (Attachment G). Cadmium, lead, and nickel were also detected on April 10. S.H. Bell does not handle any materials containing cadmium or lead and did not handle or process any materials containing nickel on this day. Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors on this day, the detection of cadmium, lead, and nickel on this day suggests that metal emissions from an offsite source were being blown onto S.H. Bell's property. As further support for this suggestion, S.H. Bell reviewed the April FEM PM₁₀ data from the monitors located in the four cardinal directions at the facility. This data shows that a high amount of PM₁₀ was being blown onto S.H. Bell's property on April 10.

A review of the limited information in the EPA Toxics Release Inventory ("TRI") database shows that there is at least one source that is south/southwest of the S.H. Bell facility that emits metals, including cadmium, lead, nickel, and manganese. Additionally, EPA's XACT Metals Study for Southeast Chicago identifies several facilities to the south/southwest of the S.H. Bell facility that emit cadmium, lead, nickel, and manganese. See U.S. EPA's XACT Metals Study: Southeast Chicago, dated September 10, 2015, at p. 6-12.¹⁵ Accordingly, it is not an unreasonable supposition that the offsite metals emissions that were blown onto S.H. Bell's property on April 10 included manganese in addition to the known offsite metals emissions of cadmium, lead, and nickel.

The April manganese data also clearly shows that there is a source of manganese to the northeast of the facility. On April 13, the manganese level was $0.254 \mu\text{g}/\text{m}^3$ when the winds were solely out of the east/northeast direction and thus, blowing towards the facility and the PM₁₀ FRM monitors for a full twenty four hours. Accordingly, the manganese level and the levels of the other metals measured on April 13 are not from the S.H. Bell facility and reflect a one hundred percent off-site contribution from another source or sources.

The data also suggests that there is a continuing source of background concentration of manganese in the area as noted in our previous letter because the data set includes three weekend days (April 1, 16, and 22) that had detectable levels of PM₁₀ manganese days when neither S.H. Bell nor many other companies operate.

Evaluation of May Data

In evaluating the manganese data and the meteorological data from May 2017, S.H. Bell noticed that there were days where the manganese readings were potentially impacted by emissions from off-site sources, namely, May 1st, May 16th, May 22nd, and May 31st.

On both May 16 and May 22, the winds were consistently from the south/southwest. See May 16, 2017 wind rose and May 22, 2017 wind rose (Attachments H and I, respectively). As noted in the May PM₁₀ FRM Data, arsenic, cadmium, lead, nickel, and vanadium were also detected on May 16 and May 22. S.H. Bell does not handle any materials containing arsenic, cadmium or lead and did not handle or process any materials containing nickel or vanadium on these days. Additionally, it is worth noting that arsenic, cadmium, lead, nickel, and vanadium were detected in relatively higher concentrations on these days than observed in previous monitor data. Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors on these days, the detection of arsenic, cadmium, lead, nickel, and vanadium suggests that metal emissions, including manganese, from an offsite source(s) were being blown onto S.H. Bell's property.

¹⁵ Available at

https://www.cityofchicago.org/content/dam/city/depts/cdph/environmental_health_and_food/AINRDCS_upComKinderMorganVarReq_3102017.pdf.

As further support for this suggestion, S.H. Bell reviewed the May FEM PM₁₀ data from the monitors located in the four cardinal directions at the facility. This data shows that a high amount of PM₁₀ was being blown onto S.H. Bell's property on May 22. The FEM PM₁₀ monitors were down for maintenance on May 16. May 16, however, was a relatively windy day in Chicago where the 14:00 to 15:00 hours had average wind speeds over 15 mph and maximum wind gusts during this time were 30-33 mph. The average wind speeds and maximum wind gusts on May 16 were greater than measured on May 22 when a high amount of PM₁₀ was recorded being blown onto S.H. Bell's property. Accordingly, it is very likely that a high amount of PM₁₀ was being blown onto S.H. Bell's property on May 16 as well.

As noted previously, there are sources that have been identified to the south/southwest of the S.H. Bell facility that emit arsenic, cadmium, lead, nickel, and manganese. Accordingly, it is not an unreasonable supposition that the offsite metals emissions that were blown onto S.H. Bell's property on May 16 and May 22 included manganese in addition to the known offsite metals emissions of arsenic, cadmium, lead, nickel, and vanadium. Likewise this supposition is not unreasonable for May 1, where the winds were consistently from the south/southwest as well even though the May FEM PM₁₀ data was relatively consistent across all monitors. Offsite metals emissions, including cadmium, lead, nickel, and vanadium were detected at the monitor. S.H. Bell did not handle or process any materials containing nickel or vanadium on this day and, as noted previously, it does not handle any bulk materials containing cadmium and lead. Accordingly, it is reasonable to assume that some amount of manganese was being blown onto S.H. Bell's property on May 1 along with the metals that clearly did not originate from S.H. Bell from the identified sources to the southwest of the facility that emit manganese and these other metals.

On May 31, the winds were predominantly from the west. See May 31, 2017 Wind Rose (Attachment J). The May PM₁₀ FRM Data shows arsenic, lead, nickel, and vanadium were also detected on May 16 and May 22. S.H. Bell does not handle any bulk materials containing arsenic or lead and did not handle or process any materials containing nickel or vanadium on this day, which suggests that offsite metals emissions that were blown onto S.H. Bell's property.

The data also suggests that there is a continuing source of background concentration of manganese in the area as noted in our previous letter because the data set includes three weekend days (May 7, 13, and 28) that had detectable levels of PM₁₀ manganese days when neither S.H. Bell nor many other companies operate.

Evaluation of June Data

The relative consistency of the June manganese data (with the exception of June 6) is very perplexing as it does not match the variability observed in the other months. Unlike many industrial sources, the S.H. Bell facility is a batch operation and thus, any emissions from the facility will not be consistent. S.H. Bell has not identified anything with respect to its operation

or production on the days that the June FRM monitors were recording ambient concentrations that could account for the relative consistency in the manganese data for June.

Additionally, the data continues to suggest that there is a continuing significant source of background concentration of manganese in the area because the data set includes three weekend days (June 3, 18, and 24) that had detectable levels of PM₁₀ manganese days when neither S.H. Bell nor many other companies operate. These weekend days, June 3, 18, and 24, also had detections of metals that S.H. Bell does not handle and had higher PM₁₀ concentrations being blown on-site based on a review of the June meteorological data and FEM PM₁₀ data.

Further, the evaluation of the metals data with the meteorological data from June 2017 shows that offsite and/or background sources are likely continuing to contribute to the levels at the PM₁₀ FRM monitors, including the manganese readings. For example, the monthly averages for arsenic and lead significantly increased for June, with the arsenic monthly average increasing an order of magnitude (*i.e.*, approximately ten times higher) and the lead monthly average steadily increasing to more than double the monthly average for March. *See* Attachments K and L. The increase in the monthly average for arsenic and lead not only indicates that there are offsite metal contributions as S.H. Bell does not handle any bulk materials containing arsenic or lead, but also that offsite metal contributions increased significantly for this month. The June data also shows that the PM₁₀ FRM monitors continue to be impacted by offsite contributions of cadmium as S.H. Bell likewise does not handle any materials containing this metal.

As noted previously, U.S. EPA's XACT Metals Study for Southeast Chicago identifies several facilities to the south/southwest of the S.H. Bell facility that emit arsenic, cadmium, lead, nickel, and manganese. *See* U.S. EPA's XACT Metals Study: Southeast Chicago, dated September 10, 2015, at p. 6-12.¹⁶ The June PM₁₀ FRM Data continues to show that arsenic, cadmium, and lead (in addition to manganese) are detected in the PM₁₀ FRM monitors on the days (namely, June 9, 12, and 15) when the winds are persistently out of the south/southwest (especially during typical working hours) and thereby blowing from the direction of the facilities identified in the EPA XACT Metals Study for Southeast Chicago towards the S.H. Bell facility.¹⁷ Nickel was also detected in higher than normal concentrations on June 9, 12, and 15 yet S.H. Bell did not process, handle, receive, or ship out any materials containing

¹⁶ Available at

https://www.cityofchicago.org/content/dam/city/depts/cdph/environmental_health_and_food/A1NRDCS_upComKinderMorganVarReq_3102017.pdf.

¹⁷ The winds were also blowing from the south/southwest on June 30. However, only half the typical working day had winds blowing from this direction with majority of the other half having winds blow from the easterly directions where it has been noted previously that the data shows a significant offsite contributor of manganese to the northeast/east of the facility. Accordingly, while speculations cannot be made, it is clear that there was an offsite contribution of metals as lead, arsenic, cadmium, and nickel were detected in the PM₁₀ FRM monitor this day.

nickel in the month of June. Additionally, on June 9, 12, and 15, there were high offsite contributions of PM₁₀ being blown onto S.H. Bell's property during typical working hours from the south/southwest direction according to the June FEM PM₁₀ data for the S.H. Bell facility. Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors on these days, the offsite PM₁₀ contributions along with the detection of arsenic, cadmium, lead, and nickel suggests that metal emissions, including manganese, from an offsite source(s) were being blown onto S.H. Bell's property.

As noted previously, the June data also supports a significant offsite manganese contributor to the northeast/east of the facility. On June 21, the manganese level was 0.574 µg/m³ when the winds were persistently out of the east/northeast direction and thus, blowing towards the facility. Accordingly, the manganese level and the levels of the other metals measured on June 21 are not from the S.H. Bell facility and reflect a one hundred percent off-site contribution from another source or sources.

Evaluation of July Data

The manganese average in July decreased approximately 46% from the manganese average in June, which is consistent with the percent reductions in averages in July for cadmium (46% decrease) and lead (40% decrease).

The preliminary statistical analysis, as discussed previously was run using the July data and showed a moderate correlation between the measured manganese concentrations at the monitor and both cadmium ($r^2 = 0.30$) and lead ($r^2 = 0.29$) concentrations. This correlation is useful in assessing the days in July where the manganese level was above µg/m³.

On July 18, the winds were split between the south/southwest and the east. A review of July FEM PM₁₀ data shows a high amount of PM₁₀ was being blown onto S.H. Bell's property on July 18, especially when the winds blowing out of the southwest towards S.H. Bell's property. The lead, cadmium, and manganese levels were higher on July 18. Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors on this day, the detection of higher levels of cadmium and lead suggest that some manganese was being blown onto the property along with the cadmium and lead on this day from an offsite source(s) since higher cadmium and lead levels are likely positively correlated with higher manganese levels.

On July 12, the winds were persistently out of the south/southwest as well and the offsite metals, including as lead and cadmium were relatively higher as well on this day. Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors on this day, the detection of higher levels of cadmium and lead suggest that some manganese was being blown onto the property along with the cadmium and lead on this day from an offsite source(s) since higher cadmium and lead levels are likely positively correlated with higher manganese levels. Additionally, offsite metals emissions of arsenic, nickel, and vanadium were detected in monitor on July 12. S.H. Bell did not handle or process any materials containing nickel or vanadium on this day and, as noted previously, it does not handle any materials containing

arsenic. Therefore, it is clear that offsite metals emissions were impacting the PM₁₀ FRM monitors on this day.

However, for July 12, S.H. Bell concluded that gusting winds appeared to impact the initial transfer to packaging operations at the box filling station at the facility which may have contributed to the higher measured manganese level on this day. July 12 was a very windy day with gusts over 20 mph. There have never been any documented opacity exceedances at the Facility's box filling station. Upon learning this information and after evaluating the July 12 filter analysis results, S.H. Bell began using the mobile misters during all initial transfers of material (*i.e.*, the initial drop to the hopper feeder) at the box filling station even though this operation is enclosed.

Once again, July manganese data also clearly shows that there is a source of manganese to the northeast of the facility. On July 24, the manganese level was 0.304 µg/m³ when the winds were solely out of the northeast and thus, blowing towards the facility and the PM₁₀ FRM monitors for a full twenty four hours. *See* July 24, 2017 wind rose (Attachment M). Accordingly, the manganese level and the levels of the other metals measured on July 24 are not from the S.H. Bell facility and percent off-site contribution from another source or sources.

Further, the data continues to suggest that there is a continuing source of background concentration of manganese in the area because the data set includes three weekend days (July 9, 15, and 30) that had detectable levels of PM₁₀ manganese days when neither S.H. Bell nor many other companies operate.

Evaluation of August Data

On August 2, there were two predominant wind directions, with winds coming out of the southwest about half the working day and with the winds coming out of the east direction for the other half of the day. *See* August 2, 2017 Wind Rose (Attachment N). As noted in the August PM₁₀ FRM Data, offsite metals emissions of arsenic, cadmium, lead, nickel, and vanadium were also detected on August 2.¹⁸ Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors for part of this day, the detection of arsenic, cadmium, lead, nickel, and vanadium on this day suggests that metal emissions from an offsite source were being blown onto S.H. Bell's property. As further support for this suggestion, S.H. Bell reviewed the August FEM PM₁₀ data from the monitors located in the four cardinal directions at the facility. This data does indicate that on August 2 there were certain hours where a higher amount of PM₁₀ was being blown onto S.H. Bell's property.

Additionally, S.H. Bell has previously observed higher concentrations of manganese on days, specifically April 13, June 21, and July 24, when the winds are persistently out of the northeast/east direction for the entire day such that the PM₁₀ FRM monitor was only measuring offsite contributions. Accordingly, such information suggests that there is a source of

¹⁸ S.H. Bell did not handle or process any materials containing nickel or vanadium on this day.

manganese in the east/north east direction that could have impacted the monitor when the winds were blowing from this east/northeast direction with the split in the predominant wind direction on August 2.

On August 14 and August 17, the winds were consistently from the south/southwest direction. Offsite metals emissions were detected in the monitor on both of these days.¹⁹ Additionally, it is worth noting that the cadmium and lead were detected in relatively higher concentrations on both August 14 and August 17, which is consistent with previously discussed potential correlation between manganese, cadmium, and lead levels. Nickel was also detected at a relatively higher concentration on August 17. Accordingly, even though the winds were blowing across the facility to the PM₁₀ FRM monitors on these days, the detection of offsite metals, especially cadmium and lead, suggests that metal emissions, including manganese, from an offsite source(s) were being blown onto S.H. Bell's property on both August 14 and August 17. As further support for this suggestion, S.H. Bell reviewed the August FEM PM₁₀ data from the monitors located in the four cardinal directions at the facility. This data does indicate that there were certain hours where a higher amount of PM₁₀ was being blown onto S.H. Bell's property on both of these days. This assessment is logical because as noted previously there are sources to the southwest of the S.H. Bell facility that have been identified as emitting metals, including cadmium, lead, nickel, and manganese.

The data also suggests that there is a continuing source of background concentration of manganese in the area as noted in our previous letters because the data set includes three weekend days (August 5, 20, and 26) that had detectable levels of PM₁₀ manganese days when neither S.H. Bell nor many other companies operate.

In sum, this evaluation of the data suggests that offsite sources are important factors in causing or contributing to the relatively higher daily levels of manganese that have been measured by the monitors.

F. Closing

To conclude the objections, we have a substantial question as to whether the agency can proceed with the allegation that S.H. Bell is causing or contributing to "Air Pollution" in light of the objections above, especially with respect to the absence of a demonstrated public health threat. As shown through the recent data and the preliminary risk assessment, the levels of ambient manganese measured at the facility's fence line monitors are not "in sufficient quantities and of such characteristics and duration" to cause any injury to human health according to U.S. EPA's and ATSDR's own best available science.

¹⁹ S.H. Bell did not handle or process any materials containing nickel or vanadium on this day.

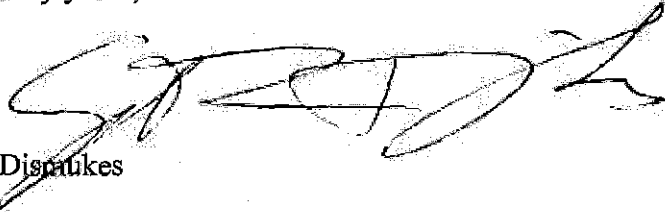
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ATTORNEYS AT LAW

Ms. Nicolle Cantello
October 2, 2017
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We appreciate in advance U.S. EPA's careful consideration of the information presented in this letter. Should you have any questions, please let me know.

Very truly yours,



Scott Disputes

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ATTACHMENT A

PLACEHOLDER FOR CBI
MATERIAL

ATTACHMENT B

**Preliminary Risk Assessment of Manganese in
Ambient Air at the S.H. Bell Company Facility in
Chicago, Illinois**

Prepared for
S.H. Bell Company
10218 S. Avenue O
Chicago, Illinois 60617

September 19, 2017



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Table 3.1 Mn PM₁₀ Air Concentrations, Exposure Concentrations, and Hazard Indices

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Figure ES.1 S.H. Bell Chicago Mn PM₁₀ Concentrations Compared to Mn Air Concentrations with No Health Effects

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Executive Summary

Gradient has reviewed the S.H. Bell Chicago manganese (Mn) PM₁₀¹ air monitoring data available on the US Environmental Protection Agency (US EPA) in Illinois website (US EPA, 2017). The website includes data from March-July 2017. S.H. Bell provided Gradient with additional Mn PM₁₀ monitoring data from August 2017. Gradient conducted a preliminary risk evaluation from these Mn data, the results of which are summarized below.

- Gradient conducted a conservative screening-level risk evaluation, consistent with US EPA risk assessment guidelines (US EPA, 1989), from 6 months of Mn PM₁₀ data collected at the S.H. Bell Chicago facility. Mn concentrations ranged from 0.018-1.23 µg/m³, with an arithmetic mean (or average) of 0.292 µg/m³ for the March-August 2017 data. The arithmetic mean Mn PM₁₀ concentrations for the March-June and March-July 2017 data were 0.318 µg/m³ and 0.310 µg/m³, respectively, indicating that the mean Mn concentration has decreased over time.
- We compared the Mn air concentrations (adjusted for an exposure frequency of 350 days per year, per US EPA guidelines) to the Agency for Toxic Substances and Disease Registry (ATSDR) chronic Mn Minimum Risk Level (MRL) of 0.3 µg/m³ (ATSDR, 2012). The MRL is a health-protective air concentration that is well below the level of Mn in air estimated to cause no adverse effects following continuous exposure (34 µg/m³) and well below the threshold Mn concentration that is not expected to increase normal levels of Mn in the brain (10 µg/m³). This comparison results in a hazard index (HI). HIs at or below 1 mean that there is no risk of adverse effects.² The results of this comparison are presented in Figure ES.1 below.
- HIs calculated from mean Mn PM₁₀ concentrations from data from the three exposure periods (March-June 2017, March-July 2017, and March-August 2017) are all at or below 1 (see below), indicating there is no risk of adverse neurological effects, the most sensitive health endpoint for Mn, for the general population (including sensitive subpopulations) from continuous inhalation of Mn in ambient air in the vicinity of the S.H. Bell Chicago, Illinois facility.
 - HI for March-June 2017 data = 1
 - HI for March-July 2017 data = 1
 - HI for March-August 2017 data = 0.9
- In addition, the risk calculation is based on a high estimate of Mn exposure that assumes a resident inhales outdoor air at their home for 24 hours per day, for 350 days per year. Consistent with the US EPA exposure factor guidelines, it is likely that time spent indoors and away from home would effectively reduce the Mn exposures by about 50%, reducing the HIs further.
- Given the conservative and health-protective basis of the Mn risk calculations in our evaluation, Gradient concludes, based on the available data, that there is no evidence that Mn in ambient air near the S.H. Bell Chicago facility will cause adverse health effects in the nearby community.

¹ PM₁₀ = Particulate matter ≤10 µm in diameter.

² This is based on US EPA's target HI of 1, meaning that no adverse effects are expected in the population if the HI is equal to 1 or lower (US EPA, 1989). An HI greater than 1 does **not** mean that adverse effects are likely to occur, but that more investigation may be necessary.

- Because ATSDR's chronic Mn MRL is derived for comparison to an exposure concentration averaged over 1 year or more, Mn PM₁₀ data collection should continue at least through the end of February 2018 and the Mn risk should be re-evaluated at that point.

Sections 1-4 present the details of our risk evaluation.

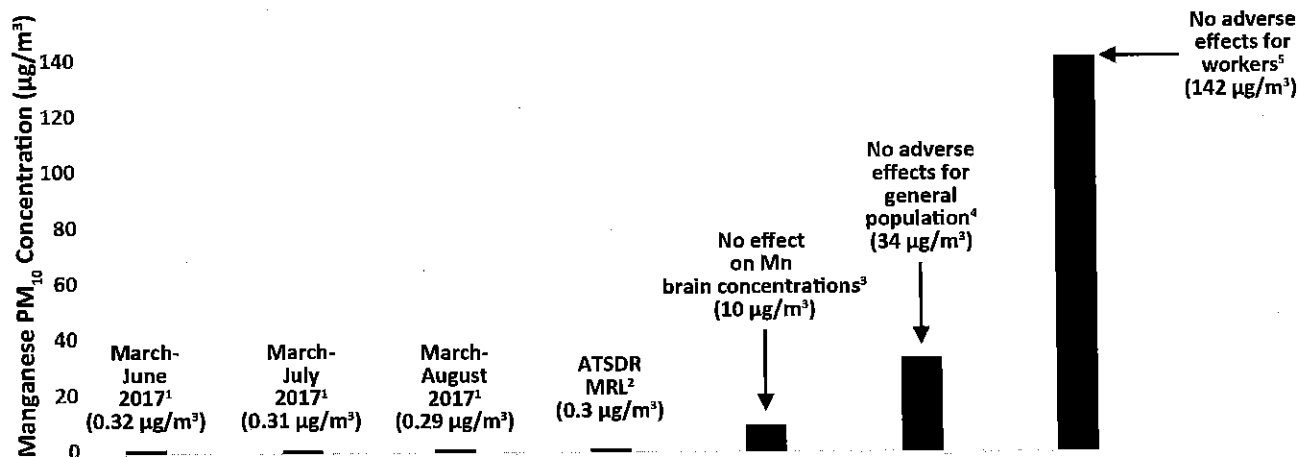


Figure ES.1 S.H. Bell Chicago Mn PM₁₀ Concentrations Compared to Mn Air Concentrations with No Health Effects. ATSDR = Agency for Toxic Substances and Disease Registry; Mn = Manganese; MRL = Minimal Risk Level; PM₁₀ = Particulate Matter ≤10 µm in Diameter. (1) Mn PM₁₀ concentrations represent the arithmetic mean concentration over the exposure period listed. (2) ATSDR MRL = 0.3 µg/m³ (ATSDR, 2012). (3) Exposure concentration at or below which Mn levels in the brain are not expected to increase above normal levels for fetuses, infants, children, and adults (Schroeter *et al.*, 2011, 2012; Yoon *et al.*, 2011). (4) No adverse effect for the general population (*i.e.*, continuous exposure) estimated from the no adverse effect worker exposure concentration (142 µg/m³ x 5/7 days per week x 8/24 hours per day = 34 µg/m³). (5) No adverse effect worker exposure concentration estimated from the Roels *et al.* (1992) study (*i.e.*, BMDL₁₀, or 95% lower confidence limit on the benchmark dose for a 10% extra risk compared to controls).

1 Manganese Air Monitoring Data and Exposure Evaluation

Gradient has reviewed the S.H. Bell Chicago manganese (Mn) PM₁₀³ air monitoring data available on the US Environmental Protection Agency (US EPA) in Illinois website (US EPA, 2017). The website includes data from March-July 2017. S.H. Bell provided Gradient with additional Mn PM₁₀ data from August 2017.⁴ This section describes the Mn data and exposure evaluation applied in the risk assessment.

1.1 Mn Air Monitoring Data

Mn PM₁₀ air monitoring data from US EPA's S.H. Bell Chicago Air Monitoring Data website (US EPA, 2017) consist of approximately 10 samples per month (approximately 1 sample collected every 3 days), for a total of 61 samples collected from the beginning of March through the end of August 2017. Mn samples were collected from the S4 monitoring station, which is one of four monitoring stations located on the S.H. Bell property. The S4 monitoring station is located in the northern portion of the S.H. Bell property, as depicted on the US EPA website (US EPA, 2017).

Mn concentrations ranged from 0.018-1.23 µg/m³, with an arithmetic mean of 0.292 µg/m³ for the March-August 2017 data. The arithmetic mean Mn PM₁₀ concentrations for the March-June and March-July 2017 data were 0.318 µg/m³ and 0.310 µg/m³, respectively, indicating that the mean Mn concentration has decreased over time. The arithmetic mean concentrations, described on the US EPA in Illinois website (US EPA, 2017), are used to derive the exposure point concentrations described below.

Note that, as described below, the risk evaluation applies the Agency for Toxic Substances and Disease Registry's (ATSDR) chronic Mn Minimal Risk Level (MRL) that is derived for application to an exposure concentration averaged over 1 year or more. The data used in this evaluation include 6 months of air samples during the spring and summer months, and, therefore, do not reflect Mn concentrations during other times of the year, when concentrations may differ (September-February). Sampling should continue during these months, and the risk evaluation should be conducted again with at least a full year of Mn PM₁₀ data.

1.2 Mn Exposure Concentrations

The Mn inhalation exposure concentration (EC) is calculated as follows, per US EPA risk assessment guidelines (US EPA, 1989):

$$EC (\mu\text{g}/\text{m}^3) = CA \times EF \times ED \div AT$$

where:

CA = Average Mn PM₁₀ Concentration in Air (µg/m³) (US EPA, 2017)
EF = Exposure Frequency (days/year)

³ PM₁₀ = Particulate matter ≤10 µm in diameter.

⁴ These data are preliminary and have not undergone quality assurance/quality control (QA/QC) review.

ED = Exposure Duration (years)
AT = Averaging Time (days)

US EPA typically considers a high-end residential exposure frequency of 350 days per year, an exposure duration of 30 years, and an averaging time of 30 years (or 10,950 days) for non-cancer risk evaluations (US EPA, 1989).

With these exposure assumptions, we calculate the following Mn ECs from the data for three exposure periods (March-June 2017, March-July 2017, and March-August 2017).

March-June 2017 data (40 samples) result in an EC of 0.305 $\mu\text{g}/\text{m}^3$:

$$\begin{aligned}\text{EC} &= 0.318 \mu\text{g}/\text{m}^3 \times 30 \text{ years} \times 350 \text{ days/year} \div 10,950 \text{ days} \\ \text{EC} &= 0.305 \mu\text{g}/\text{m}^3\end{aligned}$$

March-July 2017 data (51 samples) result in an EC of 0.297 $\mu\text{g}/\text{m}^3$:

$$\begin{aligned}\text{EC} &= 0.310 \mu\text{g}/\text{m}^3 \times 30 \text{ years} \times 350 \text{ days/year} \div 10,950 \text{ days} \\ \text{EC} &= 0.297 \mu\text{g}/\text{m}^3\end{aligned}$$

March-August 2017 data (61 samples) result in an EC of 0.280 $\mu\text{g}/\text{m}^3$:

$$\begin{aligned}\text{EC} &= 0.292 \mu\text{g}/\text{m}^3 \times 30 \text{ years} \times 350 \text{ days/year} \div 10,950 \text{ days} \\ \text{EC} &= 0.280 \mu\text{g}/\text{m}^3\end{aligned}$$

1.2.1 Consideration of Time Spent Indoors and Away from Home

It is important to point out that the Mn ECs estimated above are for a resident who inhales Mn in outdoor air for 24 hours per day, for 350 days per year. The selection of 24 hours per day as the daily exposure duration implicitly assumes either that residents are outdoors for 24 hours per day, for 350 days per year, or that the concentration of indoor Mn particulates is the same as outdoor Mn particulates. Neither assumption is reasonable for the US population. The US EPA Exposure Factors Handbook (US EPA, 2011) reports that the 95th percentile time spent outdoors at a residence was 7.3 hours/day (30%) for adults (>18 years old) (16.7 hours/day indoors, or 70%). US EPA (2011) also indicates that the amount of time spent indoors for infants and children under the age of 2 is nearly the entire day (mean: 22 hours; 95th percentile: 24 hours). The US EPA Exposure Factors Handbook (US EPA, 2011) also indicates that the mean time spent away from home for adults who are 18-64 years old is approximately 7 hours/day (30% of time away from home).

Furthermore, a number of studies conducted in urban areas across the US and Canada have demonstrated that only a fraction of ambient particulates are capable of penetrating into homes (Ozkaynak *et al.*, 1996; Long *et al.*, 2001; Allen *et al.*, 2003; Williams *et al.*, 2003; Wallace and Williams, 2005; Sarnat *et al.*, 2006; Clark *et al.*, 2010). Particle infiltration is well-recognized to be highly variable, depending on particle properties (*e.g.*, size distribution, composition), season, home ventilation conditions, and home building characteristics (*e.g.*, age, construction type). The range of average particle infiltration factors (fraction of ambient particles remaining airborne indoors) from these studies is 0.48-0.74, with an overall average across studies of 0.60. For example, Sarnat *et al.* (2006) estimated an average particle infiltration factor of 0.48 for PM_{2.5}, based on 17 homes in Los Angeles, California. Long *et al.* (2001) estimated a PM_{2.5} infiltration factor of 0.74 from 9 residential homes in Boston, Massachusetts. More recently, Clark *et al.*

(2010) estimated an infiltration factor of 0.52 from 46 residential homes in Toronto, Canada. Because the relative contribution of ambient Mn levels would be reduced in indoor air, as compared to outdoor air, it is scientifically appropriate to incorporate information on the apportionment of time between outdoor and indoor activities when estimating effective high-end exposure concentrations.

Consideration of these more realistic exposure assumptions about time spent indoors and away from home would effectively reduce the EC by about 50%. For example, if one assumes that the outdoor Mn air concentration is $0.3 \mu\text{g}/\text{m}^3$, applying the adjustments discussed above would be as follows:

$$[(30\% \text{ time outdoors} \times 0.3 \mu\text{g}/\text{m}^3) + (70\% \text{ time indoors} \times 60\% \text{ infiltration from outdoor air} \times 0.3 \mu\text{g}/\text{m}^3)] \times 70\% \text{ of time spent at residence} = 0.151 \mu\text{g}/\text{m}^3$$

2 Dose-Response Evaluation

2.1 Manganese Essentiality and Health Effects

Mn is a naturally occurring element and the fifth-most-abundant metal in the earth's crust. Mn is an essential nutrient that is necessary for the function of several enzyme systems and cell energy production in humans. A sufficient intake of Mn is needed for the formation of healthy cartilage and bone (ATSDR, 2012) and for neuronal health (Horning *et al.*, 2015; Chen *et al.*, 2015). Therefore, a deficiency of Mn can cause adverse health effects, including adverse neurological effects. In addition, because excess Mn accumulates in the brain, exposure to elevated levels of Mn *via* ingestion or inhalation can also cause adverse neurological effects (ATSDR, 2012; Horning *et al.*, 2015). Therefore, maintaining appropriate levels of Mn in the body is critical for human health.

The most common health effects associated with chronic inhalation of elevated levels of Mn in occupational environments are neuromotor deficits (*e.g.*, tremor, hand-eye coordination) (ATSDR, 2012). Chronic exposure to high levels of Mn (*i.e.*, greater than 2 mg/m³) can cause a disabling syndrome called "manganism," which includes a dull affect, altered gait, fine tremor, headaches, and sometimes psychiatric disturbances (ATSDR, 2012). Studies suggest that chronic exposure to low levels of Mn in ambient air are unlikely to be associated with neurological effects. Typical levels of Mn in ambient air range from 0.02 µg/m³ (mean in the US) to 0.3 µg/m³, near industrial facilities (ATSDR, 2012).

2.2 Manganese Chronic Inhalation Toxicity Criteria and Application to Risk Assessment

US EPA and other regulatory agencies (*e.g.*, ATSDR) derive chronic inhalation toxicity criteria that are estimates of continuous inhalation exposure concentrations for individuals (including sensitive subpopulations) that represent negligible, if any, risk for adverse health effects during a lifetime. These toxicity criteria are derived from scientific studies in animals or humans, using either no observed adverse effect levels (NOAELs) (*i.e.*, exposure levels at which no statistically significant increases in adverse effects are observed between exposed and unexposed populations), or benchmark dose (BMD) concentrations (*e.g.*, BMDL₁₀ value, which is a 95% lower confidence limit on the BMD for a 10% extra risk compared to controls) as the point of departure (POD). The POD is typically divided by uncertainty factors (UFs) to account for various uncertainties in the underlying animal or human toxicity study (*e.g.*, sensitive subpopulations). Thus, inhalation toxicity criteria are developed to be well below concentrations that have been observed to cause adverse health effects. Regulatory agencies have different names for such criteria, although the values are derived using similar methodologies and are applied similarly in making decisions to manage risks from chemicals. For example, the US EPA inhalation criteria are termed as "reference concentrations" (or "RfCs"), and the ATSDR inhalation criteria are termed "minimal risk levels" (or "MRLs").

Exceedance of a chronic toxicity value does not indicate that any one individual is at elevated risk. That is, chronic toxicity values that include uncertainty factors and assumptions of continuous exposures, such as ATSDR MRLs and US EPA RfCs, are not intended to be an exact line above which toxic effects will occur and below which no effects will occur. US EPA has explained that toxicity criteria published in their

Integrated Risk Information System (IRIS) database cannot be used to predict whether or not an adverse health effect will occur:

In general, **IRIS values cannot be validly used to accurately predict the incidence of human disease** or the type of effects that chemical exposures have on humans. This is due to the numerous uncertainties involved in risk assessment, including those associated with extrapolations from animal data to humans and from high experimental doses to lower environmental exposures. The organs affected and the type of adverse effect resulting from chemical exposure may differ between study animals and humans. In addition, many factors besides exposure to a chemical influence the occurrence and extent of human disease. (US EPA, 2005 [emphasis added])

ATSDR includes a similar discussion in describing MRLs:

These substance-specific estimates [MRLs], which are intended to serve as screening levels, are used by ATSDR health assessors to identify contaminants and potential health effects that may be of concern at hazardous waste sites. It is important to note that **MRLs are not intended to define clean-up or action levels...** MRLs are derived for hazardous substances using the no-observed-adverse-effect level/uncertainty factor approach. They are **below levels that might cause adverse health effects in the people most sensitive to such chemical-induced effects. Exposure to a level above the MRL does not mean that adverse health effects will occur.** (ATSDR, 2012 [emphasis added])

2.2.1 Manganese Inhalation Toxicity Value

As discussed on the US EPA in Illinois website (US EPA, 2017), the arithmetic mean Mn concentration is compared to the ATSDR Mn MRL of $0.3 \mu\text{g}/\text{m}^3$ (ATSDR, 2012). The ATSDR MRL is based on the most current science and, thus, is the most appropriate toxicity value to apply in a Mn inhalation risk assessment. The ATSDR Mn MRL is based on observations of subclinical neurological effects in workers exposed to Mn for an average of 5.3 years (Roels *et al.*, 1992). ATSDR applied US EPA's BMD software to derive a BMDL_{10} POD of $142 \mu\text{g}/\text{m}^3$ for abnormal eye-hand coordination in workers exposed to respirable Mn. ATSDR adjusted the $142 \mu\text{g}/\text{m}^3$ POD to account for continuous exposure in the general population (*vs.* a worker population) ($142 \mu\text{g}/\text{m}^3 \times 5/7 \text{ days/week} \times 8/24 \text{ hours/day} = 34 \mu\text{g}/\text{m}^3$), and applied a UF of 10 for limitations/uncertainties and another UF of 10 for human variability, for a total UF of 100, resulting in an MRL of $0.3 \mu\text{g}/\text{m}^3$.⁵ Thus, the Mn MRL is 100-fold lower than the estimated continuous exposure concentration in the general population that would be expected to result in essentially no adverse effects.

Further, peer-reviewed studies suggest that Mn brain concentrations would not exceed normal levels in adults, children, neonates, or fetuses at Mn exposure concentrations as high as $10 \mu\text{g}/\text{m}^3$ (Schroeter *et al.*, 2011, 2012; Yoon *et al.*, 2011), providing further support for the conservatism of the Mn MRL of $0.3 \mu\text{g}/\text{m}^3$.

It is also important to consider that the Mn MRL is based on Mn concentrations with a mean particle aerodynamic diameter of ≤ 5 microns (μm) (PM_{05}) from the Roels *et al.* (1992) study. As discussed above, the Mn data for the S.H. Bell Chicago site are PM_{10} concentrations (*i.e.*, particle size $\leq 10 \mu\text{m}$), which include the PM_{05} fraction and particles larger than $5 \mu\text{m}$ but less than or equal to $10 \mu\text{m}$. Therefore, Mn

⁵ It is noteworthy that the MRL is rounded down to one significant figure from 0.340 to $0.3 \mu\text{g}/\text{m}^3$. Rounding the MRL to one significant figure provides support for rounding hazard indices to one significant figure. In addition, if one compares the unrounded numbers, all unrounded mean Mn PM_{10} concentrations for the S.H. Bell Chicago facility (0.297-0.318 $\mu\text{g}/\text{m}^3$) are below the unrounded Mn MRL of $0.34 \mu\text{g}/\text{m}^3$.

PM₁₀ concentrations likely overestimate Mn PM₀₅ concentrations, and, therefore, comparison of Mn PM₁₀ concentrations to the MRL likely overestimates the Mn risk.

3 Risk Calculations

Regulatory agencies typically present non-cancer risks as chronic hazard index (HI) estimates. HI estimates are calculated by dividing the exposure concentration by the chronic toxicity value. US EPA states that HI estimates should be rounded to and presented as one significant figure (US EPA, 1989). US EPA's target HI is 1, meaning that no adverse effects are expected in the population if the HI is equal to 1 or lower.

The Mn HI calculation is as follows:

$$HI = EC (\mu\text{g}/\text{m}^3) \div \text{Mn Inhalation Toxicity Value (MRL)} (\mu\text{g}/\text{m}^3)$$

where:

HI = Hazard Index
EC = Exposure Concentration
MRL = Minimum Risk Level

The Mn HI for the S.H. Bell Chicago air monitoring data (March-August 2017) is 0.9 ($HI = 0.280 \mu\text{g}/\text{m}^3 \div 0.3 \mu\text{g}/\text{m}^3 = 0.9$). The following table summarizes the Mn air concentrations, exposure concentrations, and HIs for the three exposure periods evaluated.

Table 3.1 Mn PM₁₀ Air Concentrations, Exposure Concentrations, and Hazard Indices

Exposure Period	Mean Mn PM ₁₀ Air Concentration ($\mu\text{g}/\text{m}^3$)	Mn PM ₁₀ Exposure Concentration ¹ ($\mu\text{g}/\text{m}^3$)	Hazard Index ^{2,3}
March-June 2017	0.318	0.305	1
March-July 2017	0.310	0.297	1
March-August 2017	0.292	0.280	0.9

Notes:

Mn = Manganese; PM₁₀ = Particulate Matter $\leq 10 \mu\text{m}$ in Diameter; US EPA = US Environmental Protection Agency.

(1) Mn air concentrations adjusted for an exposure frequency of 350 days per year, per US EPA guidelines (US EPA, 1989).

(2) Note that had we calculated the HIs using the 95% upper confidence limit (UCL) on the mean, as opposed to the mean that is used on the US EPA in Illinois website, for the S.H. Bell Chicago Mn air monitoring data, the hazard indices (HIs) for all exposure periods would remain at 1.

(3) US EPA guidelines (1989) indicate that hazard indices should be reported to one significant figure. As stated in the guidelines (1989) in Exhibit 8-3, "All hazard indices and hazard quotients should be expressed as one significant figure."

Note that if we adjust for more realistic exposure assumptions regarding time spent indoors and away from home, the HIs would be even lower.

4 Preliminary Risk Evaluation Conclusion

The results of our conservative preliminary risk evaluation, conducted in a manner consistent with US EPA risk assessment guidelines, indicate that there is no risk of adverse neurological effects for the general population (including sensitive subpopulations) from continuous inhalation of Mn in ambient air (collected from March-August 2017) in the vicinity of the S.H. Bell Chicago facility (HI = 0.9). Hazard indices calculated from March-June and March-July 2017 data also do not exceed 1 and, therefore, indicate no adverse effects. This conclusion is based on comparison of the Mn ECs to the ATSDR chronic Mn MRL of $0.3 \mu\text{g}/\text{m}^3$ that is well below the level of Mn in air estimated to cause no adverse effects following continuous exposure ($34 \mu\text{g}/\text{m}^3$), and well below the threshold Mn concentration that is not expected to increase normal levels of Mn in the brain ($10 \mu\text{g}/\text{m}^3$). In addition, the risk calculation is based on a high estimate of Mn exposure that assumes a resident inhales outdoor air at their home for 24 hours per day, for 350 days per year. As discussed above, it is likely that time spent indoors and away from home would effectively reduce the Mn exposures and risk estimates by about 50% in accordance with the US EPA exposure factor guidelines.

Given the conservative and health-protective basis of the Mn risk calculations in our evaluation, Gradient concludes, based on the available data, that there is no evidence that Mn in ambient air near the S.H. Bell Chicago facility will cause adverse health effects in the nearby community.

Note that although the average Mn PM_{10} air concentrations for the three exposure periods all round to $0.3 \mu\text{g}/\text{m}^3$, the concentrations have decreased slightly over time from $0.318 \mu\text{g}/\text{m}^3$ (March-June 2017), to $0.310 \mu\text{g}/\text{m}^3$ (March-July 2017), to $0.297 \mu\text{g}/\text{m}^3$ (March-August 2017). Since the ATSDR MRL is derived for comparison to an exposure concentration averaged over one year or more, Mn PM_{10} data collection should continue at least through the end of February 2018 and the Mn risk should be re-evaluated at that point.

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S.H. Bell Company
Chicago S. Ave "O" Terminal

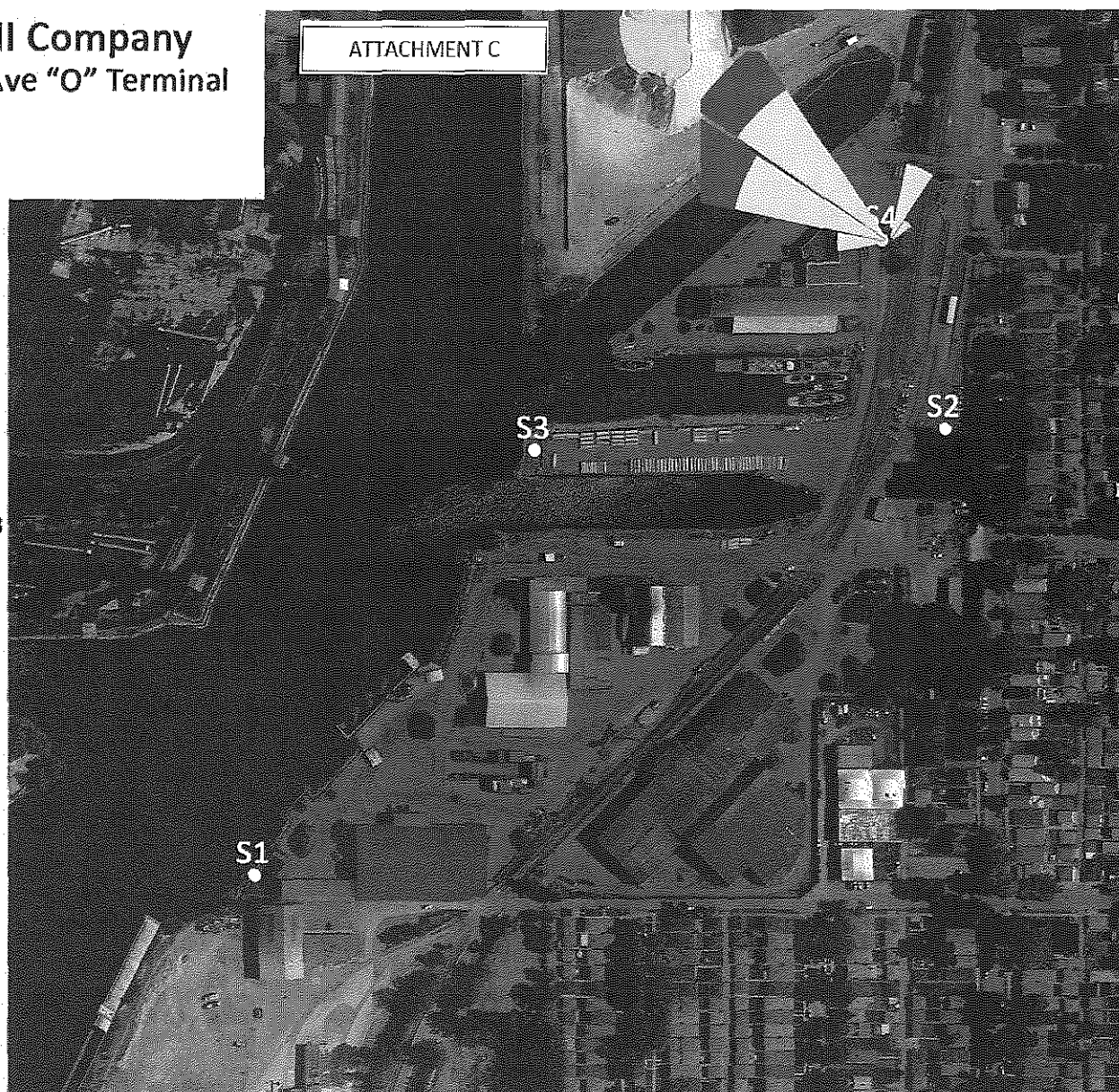
March 2, 2017

Mn: 0.397 $\mu\text{g}/\text{m}^3$

WIND SPEED
(Knots)

≥ 22
17 - 21
11 - 17
7 - 11
4 - 7
1 - 4

Calm: 0.00%



S.H. Bell Company
Chicago S. Ave "O" Terminal

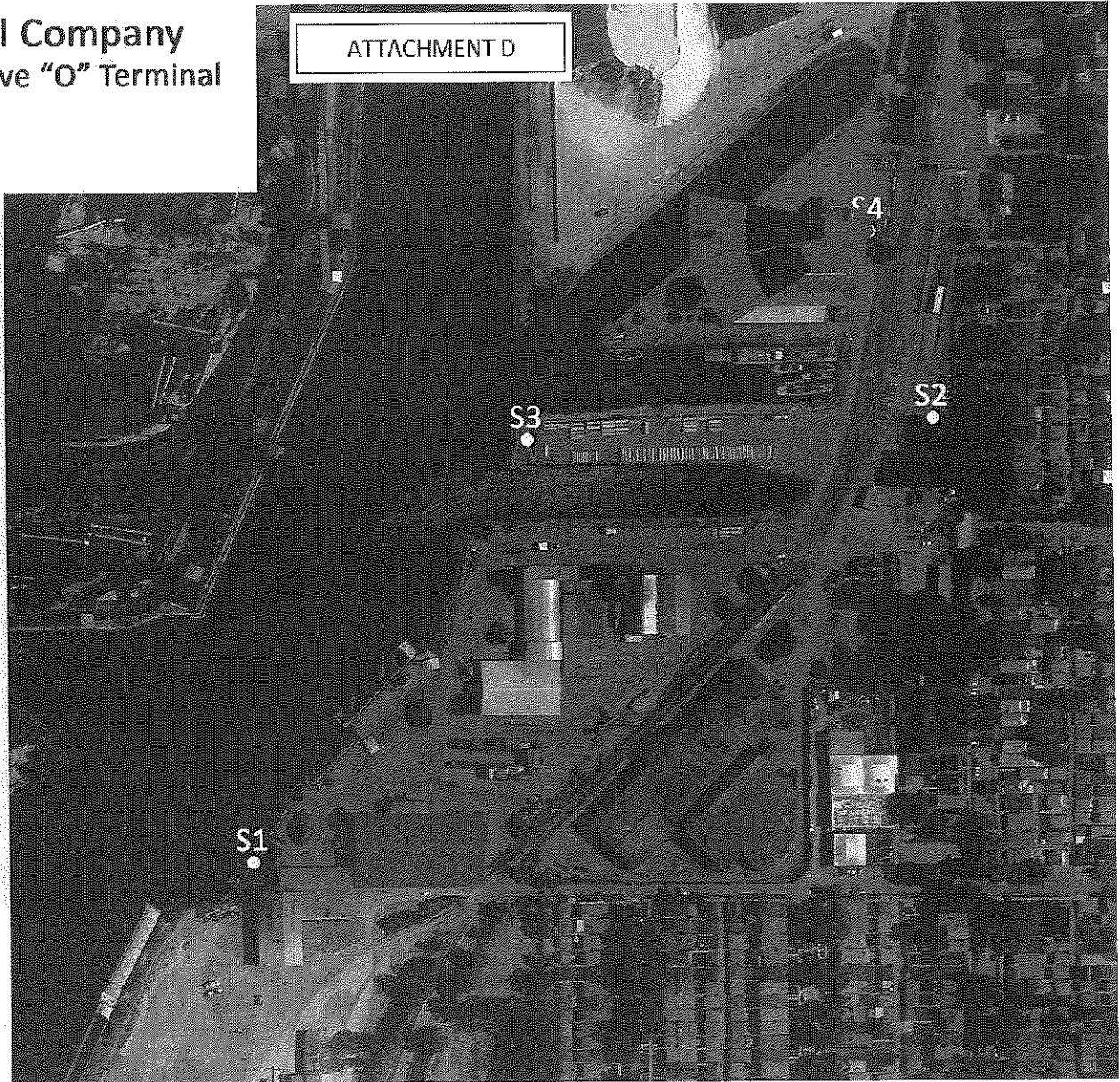
March 8, 2017

Mn: 0.765 $\mu\text{g}/\text{m}^3$

WIND SPEED
(Knots)

0-22
17-21
11-17
7-11
4-7
1-4

Calm: 0.00%



ATTACHMENT E









S.H. Bell Company
Chicago S. Ave "O" Terminal

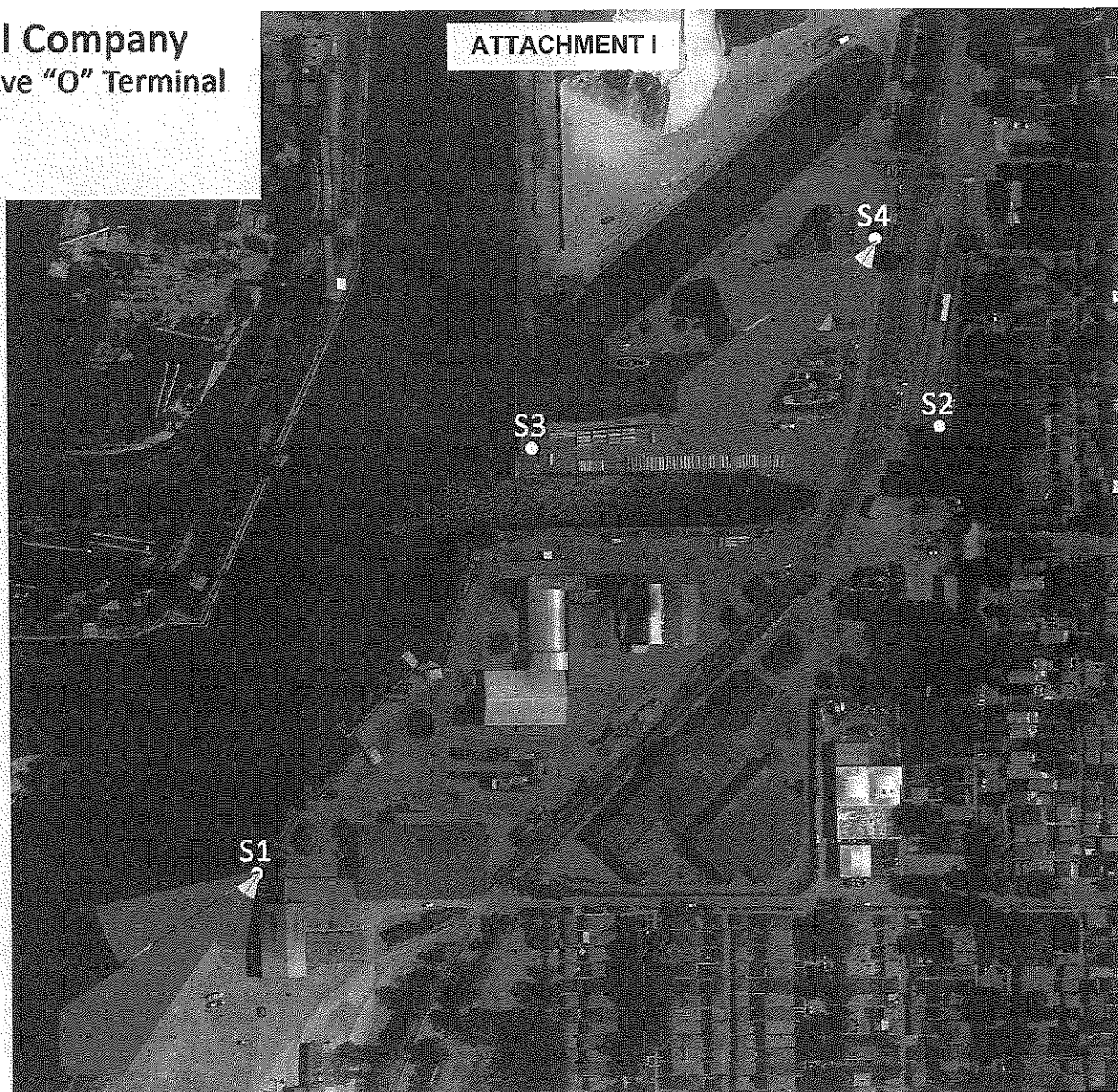
May 22, 2017

S1: 47 $\mu\text{g}/\text{m}^3$
S2: 21 $\mu\text{g}/\text{m}^3$
S3: 24 $\mu\text{g}/\text{m}^3$
S4: 24 $\mu\text{g}/\text{m}^3$

Mn: 1.10 $\mu\text{g}/\text{m}^3$

WIND SPEED
(Knots)

	>= 22
	17 - 21
	11 - 17
	7 - 11
	4 - 7
	1 - 4
Calms: 0.00%	



S.H. Bell Company
Chicago S. Ave "O" Terminal

ATTACHMENT J

May 31, 2017

S1: 41 $\mu\text{g}/\text{m}^3$

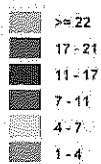
S2: 34 $\mu\text{g}/\text{m}^3$

S3: 37 $\mu\text{g}/\text{m}^3$

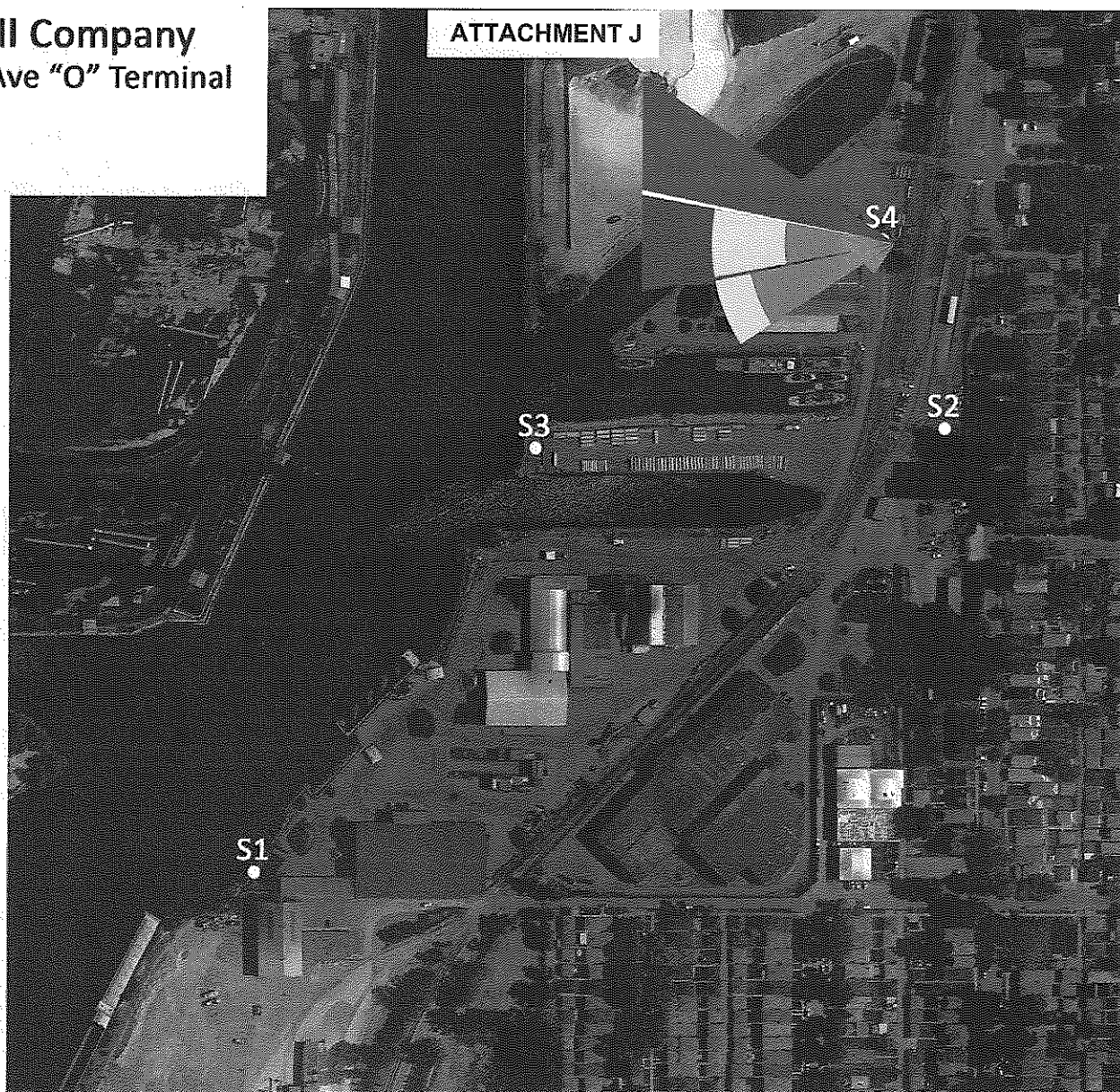
S4: 39 $\mu\text{g}/\text{m}^3$

Mn: 0.45 $\mu\text{g}/\text{m}^3$

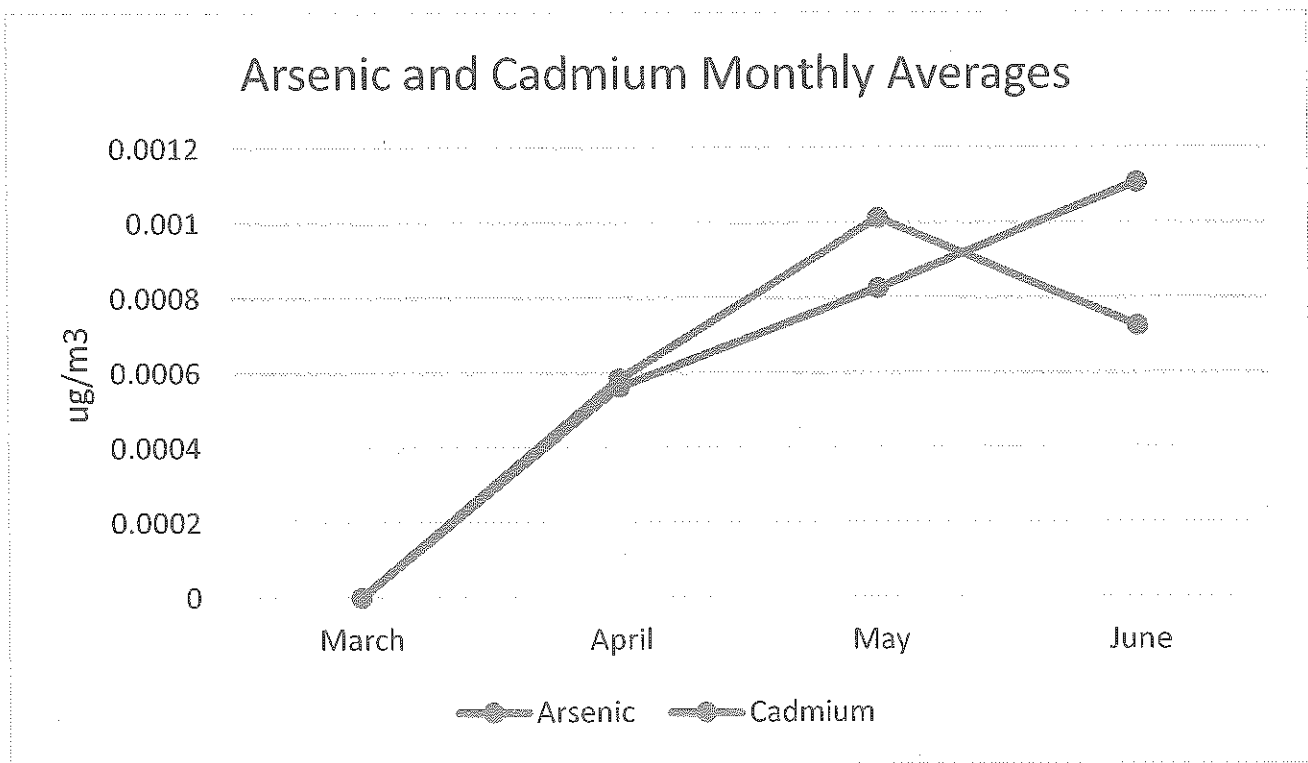
WIND SPEED
(Knots)



Calms: 0.00%

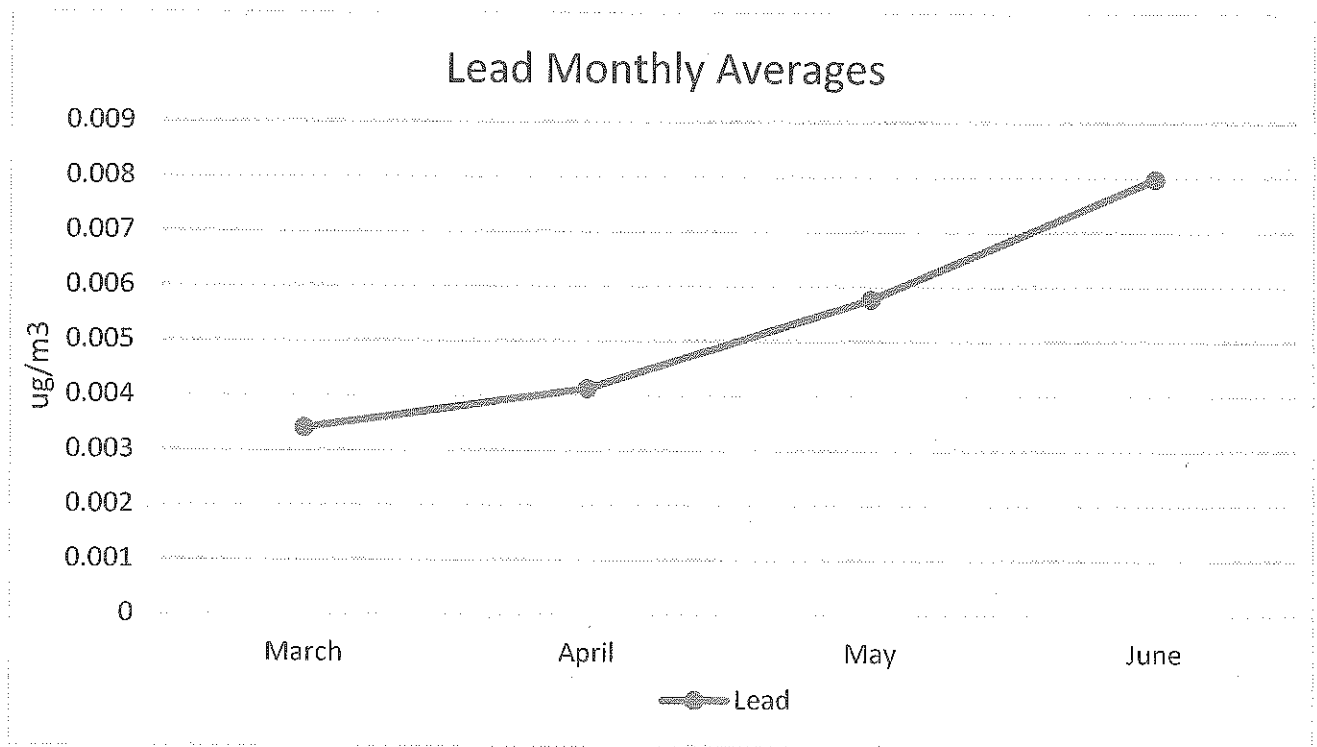


ATTACHMENT K



*The March average for cadmium and arsenic is non-detect based on the laboratory reports.

ATTACHMENT L



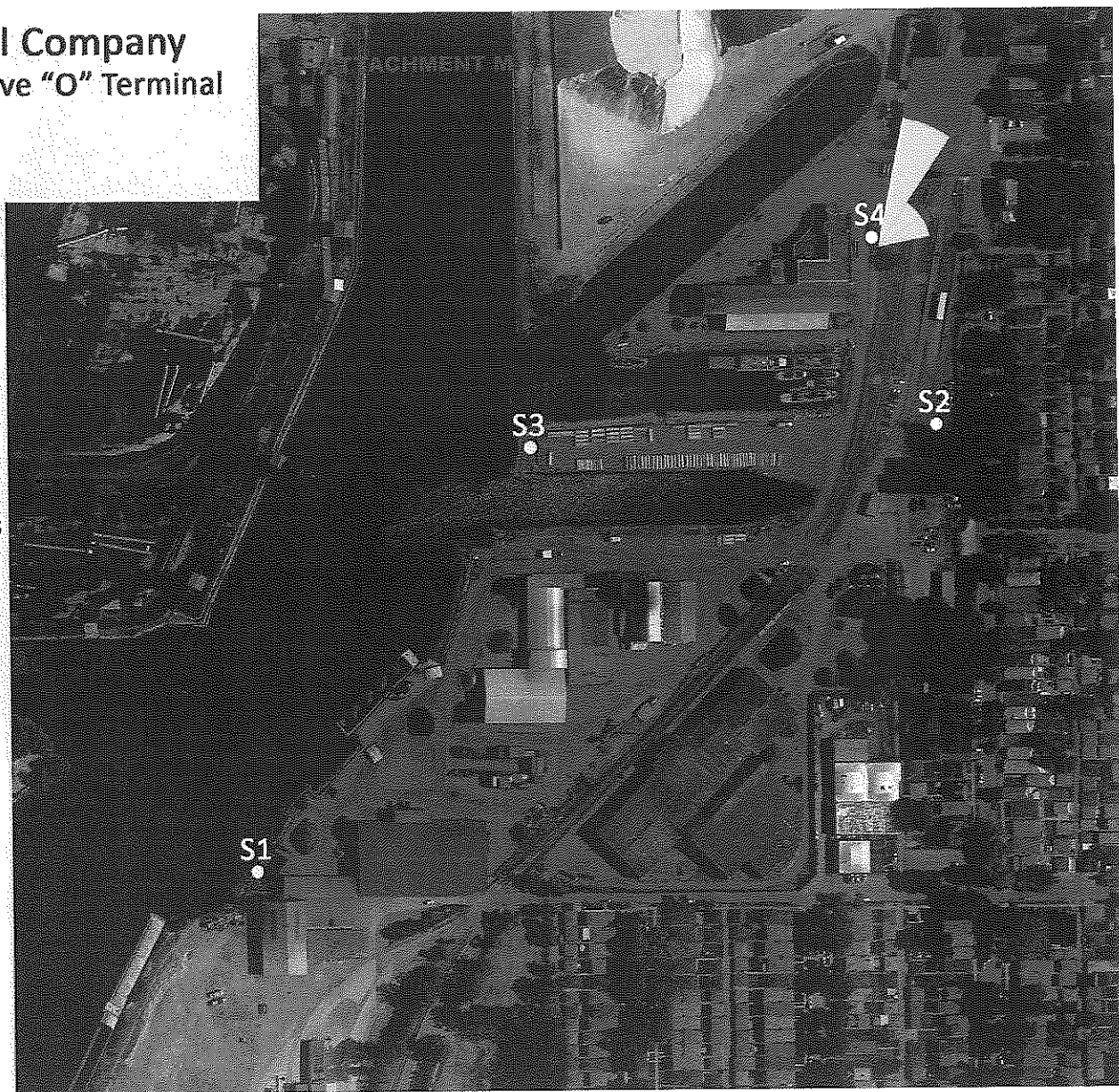
S.H. Bell Company
Chicago S. Ave "O" Terminal

July 24, 2017

Mn: 0.304 $\mu\text{g}/\text{m}^3$

WIND SPEED
(m/s)

≥ 11.10
8.80 - 11.10
5.70 - 8.80
3.60 - 5.70
2.10 - 3.60
0.50 - 2.10
Calms: 0.00%

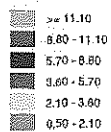


S.H. Bell Company
Chicago S. Ave "O" Terminal

Aug 2, 2017

Mn: 0.382 $\mu\text{g}/\text{m}^3$

WIND SPEED
(m/s)



Calms: 0.00%

